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## NEW AMS DATES AS A CONTRIBUTION TO THE ABSOLUTE CHRONOLOGY OF THE EARLY ENEOLITHIC IN THE CENTRAL BALKANS

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*Abstract* – In this study we present new absolute dates for the Early Eneolithic in Serbia. Four of them confirm the recently obtained dates from that period (Bubanj-Hum I culture) but two samples (from Mokranjske stene and Bubanj) provide somewhat later dates for this period, although their stratigraphic context makes their interpretation difficult. Pottery from those sites, besides the typical examples, also shows particular stylistic and typological characteristics that resemble Galatin or Sălcuța IV cultures, so one can presume that the Bubanj-Hum I culture in Serbia may have lasted longer than what is generally assumed.

*Key words* – Eneolithic, AMS-dating, Central Balkans.

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### Introduction

In South-eastern Europe, the second half of the 5<sup>th</sup> and early 4<sup>th</sup> millennium cal. BC (i.e. the Chalcolithic or Eneolithic period) witnessed extensive changes in the archaeological record, including the progressive abandonment of tells in favour of a more dispersed settlement pattern,<sup>1</sup> the growing importance of copper metallurgy,<sup>2</sup> and flat-grave cemeteries exhibiting signs of social stratification.<sup>3</sup> These transformations are reflected in the material culture with the development of various regional archaeological complexes. Although the chronological framework of these processes is relatively well known in Hungary and Bulgaria, the overall absolute chronology of the Eneolithic still requires extensive research in order to gradually shift away from traditional chronologies based on pottery and confusing regional terminologies.<sup>4</sup>

It is well known, indeed, that the chronology of Eneolithic is not uniform in all the regions of the Balkan Peninsula. For example the Early Eneolithic in Serbia corresponds to the Late Eneolithic in Bulgaria,<sup>5</sup> even if in both cases, these are defined on the basis of similar traits. The confusion in terms of nomenclature is generated by the position that occupies each eponymous site in the definition of the cultural complex. Thus, according to Garašanin and Simoska, this complex is defined as Bubanj–Hum I–Krivodol–Sălcuța,<sup>6</sup> while

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<sup>1</sup> Link 2006; Kapuran et al. 2017.

<sup>2</sup> Bartelheim, Krauß 2012.

<sup>3</sup> Higham et al. 2007.

<sup>4</sup> Schier 2014.

<sup>5</sup> Todorova 2003, 288–289.

<sup>6</sup> Гарашанин, Симоска 1976, 9.

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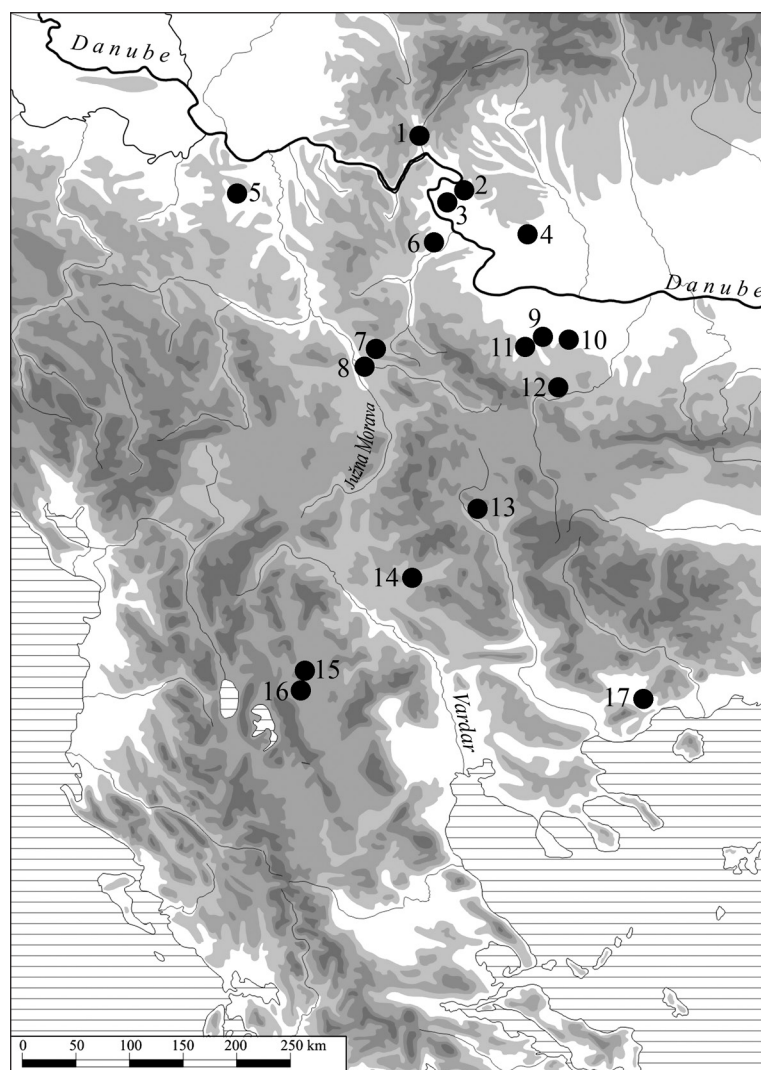


Fig. 1. List of sites mentioned in the study (the background of the map, M. Milinković):

1. Baile Herculane, RO;
2. Ostrovul Corbului, RO; 3. Bistret, RO;
4. Salcuta, RO; 5. Bodnjik, SRB;
6. Mokranjske stene, SRB;
7. Velika Humska Čuka, SRB;
8. Bubaň, SRB; 9. Galatin, BG;
10. Borovan, BG; 11. Krivodol, BG;
12. Rebarkovo, BG; 13. Slatino, BG;
14. Pilavo, MK; 15. Bakarno Gumno, MK;
16. Šuplevec, MK; 17. Dikili Tash, GR.

Сл. 1. Списак локалитетa поменутих у чланку (позадину мапе израдио М. Милинковић):

1. Баиле Херкулане, Румунија;
2. Островул Корбулуи, Румунија;
3. Бистреј, Румунија;
4. Салкуца, Румунија; 5. Бодњик, Србија;
6. Мокранске стене, Србија;
7. Велика хумска чука, Србија;
8. Бубањ, Србија; 9. Галатин, Бујарска;
10. Борован, Бујарска;
11. Криводол, Бујарска;
12. Ребарково, Бујарска;
13. Слатино, Бујарска;
14. Пилаво, Република Македонија;
15. Бакарно гумно, Република Македонија; 16. Шулевец, Република Македонија; 17. Дикили Таш, Грчка

in Garašanin and Đurić it is defined as Sălcuta–Krivodol–Bubaň.<sup>7</sup> Today the accepted definition of this chrono-cultural horizon (culture) in Serbia is Bubaň–Sălcuta–Krivodol (hereafter BSK),<sup>8</sup> while in Bulgaria this complex is defined as Krivodol–Sălcuta–Bubaň,<sup>9</sup> or Krivodol–Sălcuta–Bubaň Hum Ia.<sup>10</sup>

The area covered by the BSK complex stretches across modern-day NW Bulgaria, SW Romania, Serbia and Macedonia, and is characterised by numerous regional variants (Sălcuta in Oltenia, Bubaň–Hum I in Serbia, Krivodol in Bulgaria and Šuplevec–Bakarno Gumno in the Republic of Macedonia). As already mentioned, its precise chronological position within the south-eastern European Eneolithic is still subject to debate. In Serbia and the Republic of Macedonia, for instance, there is a regrettable lack of absolute dates: so far only three dates are available for the BSK, one from an insecure context belonging to the site of

Bodnjik,<sup>11</sup> and two further dates, recently obtained for the eponymous site of Bubaň.<sup>12</sup>

As regards relative chronology, many authors considered Bubaň–Hum I, which represents this complex in most of the Serbian territory south of the Sava and the Danube, as being parallel to the Sălcuta II phase.<sup>13</sup> According to the available stratigraphic data, finds and absolute dates from the new excavations in Bubaň and Velika Humska Čuka in south-eastern Serbia, as well as in Mokranjske Stene, in eastern Serbia, the

<sup>7</sup> Garašanin, Đurić 1983, 12.

<sup>8</sup> Tasić 1995, 29.

<sup>9</sup> Todorova 2003, 288–289.

<sup>10</sup> Георгиева 2005, 144.

<sup>11</sup> Живановић 2013.

<sup>12</sup> Bulatović, Vander Linden 2017.

<sup>13</sup> Garašanin, Симоска 1976, 20; Tasić 1995, 27.

Bubanj–Hum I culture lasted longer than previously thought and, in all likelihood, is contemporaneous with several phases of the Sălcuța culture, including Sălcuța IV. Radiocarbon dates from Romania and Bulgaria indicate that the BSK complex belongs to the late 5<sup>th</sup>/early 4<sup>th</sup> mill. cal BC. From a typo-chronological point of view, numerous traits of the material culture, such as pottery and figurines, suggest that it is partly contemporary with the Kodzadermen–Gumelnița–Karanovo VI complex to the east, as well as the Gradešnica–Slatino–Dikili Tash II complex to the south.

The BSK internal phasing and geographical evolution are problematic as well. For instance, the two aforementioned dates for the site of Bubanj point to the time period comprised of between c. 4350 and 4250 cal BC. These predate most available <sup>14</sup>C determinations for Romania,<sup>14</sup> and are either earlier than or contemporary to those for Bulgarian sites.<sup>15</sup> These discrepancies also raise questions regarding the geographical structure of the BSK complex, and the directionality of cultural influences.<sup>16</sup> Furthermore, it is also necessary to delineate more precisely the chronological framework of the BSK complex, by investigating its relationship with both preceding (Late Vinča culture in Serbia, and Gradešnica–Slatino–Dikili Tash II complex in western Bulgaria, eastern Republic of Macedonia and northern Greece) and succeeding archaeological cultures (e.g. Coțofeni–Kostolac and Cernavodă III cultures).

### New absolute dates from Serbia

In this study we present six AMS radiocarbon dates obtained from three sites: Velika Humska Čuka and Bubanj near Niš in south-eastern Serbia, and Mokranjske Stene near Negotin in eastern Serbia. Samples were submitted for counting to MAMS, the AMS facility at the Curt-Engelhorn-Centre for Archaeometry.<sup>17</sup> Calibration was performed using Oxcal 4.2.<sup>18</sup> All results are reported in Fig. 9.

Velika Humska Čuka is a stratified hilltop site ca. 8 km north of Niš (Fig. 1/7). Research on this site was first carried out in the 1930s and 1950s, and resumed in 2009 until the present day.<sup>19</sup> Excavations undertaken in 2016 and 2017 explored a structure that was partially carved in a solid rock, above which there was a large amount of fired soil, soot and ashes, which was interpreted as the remains of the above-ground part of a dwelling structure (Fig. 2). In the upper parts of the building, a large number of finds, especially potsherds and animal bones, were recovered. Among these finds, a copper chisel is of particular interest (Pl. III/1). Bowls

with inverted rims with a wart-like handle, two handled biconical beakers with a marked belly and a small biconical amphora with vertical or horizontal handles (Pl. I/1–8) were recovered in this structure, and show the characteristic features of the Bubanj–Hum I culture. Decoration techniques include graphite painting, incision, channelling and series of crescent imprints.

The radiocarbon date obtained analysing an animal bone sample (*Ovis/Capra*), which was located directly next to the chisel and the characteristic potsherds, gave a value of 5473 ± 31 BP (Fig. 2), which is 4352–4271 cal BC (68.2% probability) or 4365–4259 cal BC (95.4% probability) (Fig. 9/1). This date is important because it defines the time of use of this type of copper chisel, which is known from the Neolithic hoards discovered in the settlement of Pločnik,<sup>20</sup> which lies about 45 km from Hum. This type of chisel was also discovered at Eneolithic sites in north-eastern Bulgaria,<sup>21</sup> and is also known from Eneolithic Bodrogkeresztur contexts in today's Hungary.<sup>22</sup>

Bubanj is a stratified site on the Niš plain, on the left bank of the Nišava River (Fig. 1/8). Archaeological excavations were carried out on two occasions in the last century, following which the site was completely destroyed over time.<sup>23</sup> The remaining small part of the site (about 200 square meters) was explored between 2008 and 2014.<sup>24</sup> Four samples from the Eneolithic horizon were taken from the site's remaining stratigraphy.<sup>25</sup> Of these, two come from structures belonging to the Early Eneolithic, while the other two were taken from structures dated to the Late Eneolithic.

The first sample is a bone of a sheep/goat (*Ovis/Capra*), which was found in a deep waste pit (structure 37) dug into the virgin soil on the western periphery of

<sup>14</sup> Lazarovici 2006.

<sup>15</sup> Boyadziev 1995, Tab. 5; Merkyte 2005, Fig. II/12, II/13.

<sup>16</sup> Bulatović 2014.

<sup>17</sup> Kromer et al. 2013.

<sup>18</sup> Bronk Ramsey 2009.

<sup>19</sup> Excavations performed by the Archaeological Institute in Belgrade in cooperation with the National Museum in Niš. See: Булатовић, Милановић 2015.

<sup>20</sup> Antonović 2014, Taf. I/1–4.

<sup>21</sup> Todorova 1981, 24, Taf. 1.

<sup>22</sup> Antonović 2014, 35.

<sup>23</sup> Гарашанин, Бурић 1983; Милановић, Трајковић-Филиповић 2015.

<sup>24</sup> Bulatović, Milanović, forthcoming.

<sup>25</sup> Two samples from a ritual pit (structure 69) from this period were published earlier (Bulatović, Vander Linden 2017).

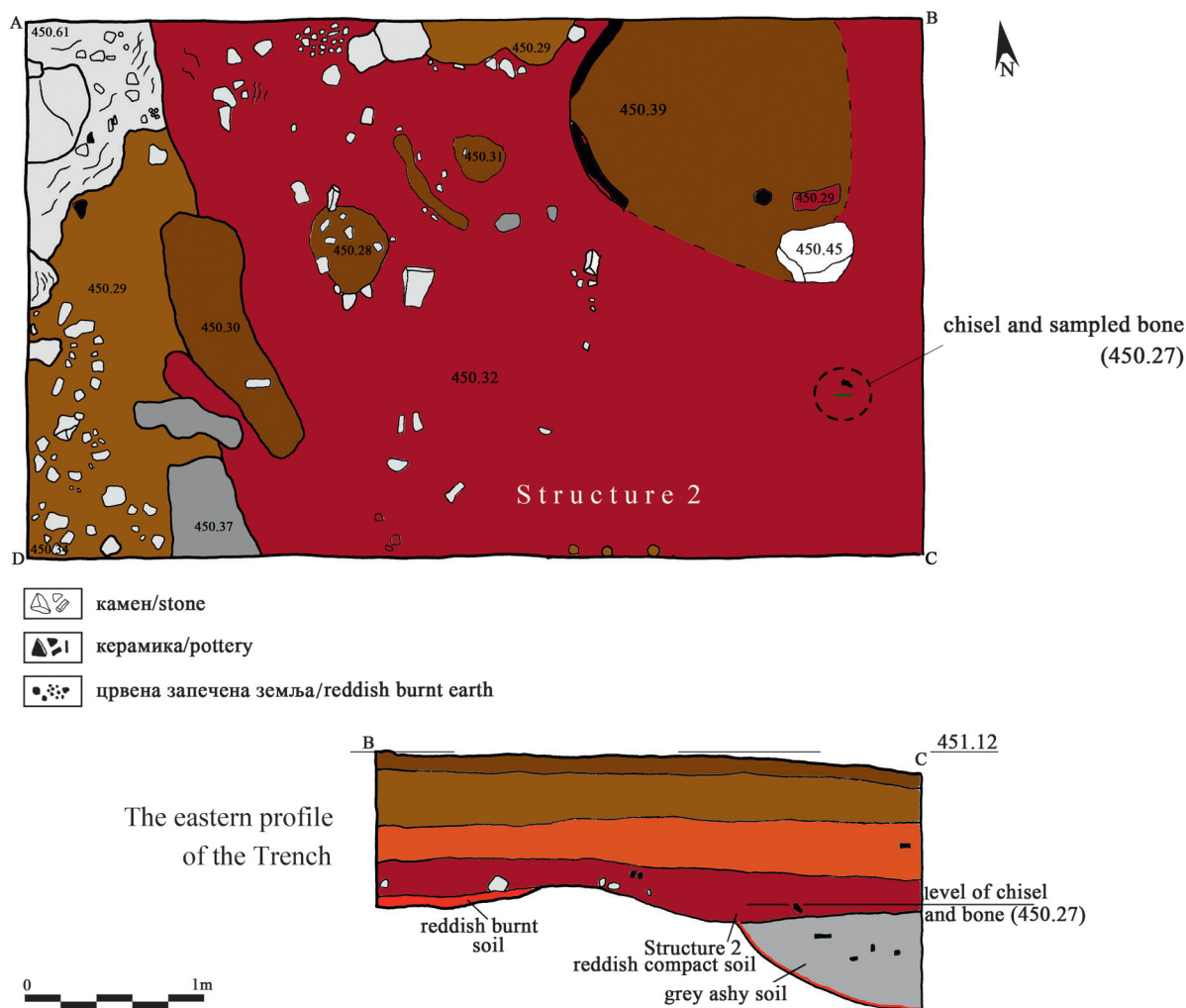


Fig. 2. Velika Humska Čuka site, position of the sampled bone in Trench 3, structure 2/16 (drawing by A. Bulatović)

Сл. 2. Велика хумска чука, контекст узорковане кости у сонди 3, објекти 2/16 (цртеж: А Булатовић)

the explored part of the site. The sample dates to between  $5440 \pm 30$  BP (Fig. 5; Fig. 9/3), that is 4339–4263 cal BC (68.3% probability), 4346–4246 cal BC (95.4% probability). Ceramics recovered in the pit (a bowl with an inverted rim, a conical bowl with a thickened rim, wide open vessels decorated with channels on the neck and the belly, vessels with a high hollow foot and amphorae with two vertical handles, etc.) are characteristic of the Bubanj–Hum I horizon (Pl. I/9–11; Pl. II/2–7).

The second sample is a piece of the long bone of an undefined animal species, found in a ritual shallow pit (structure 25/27) containing several complete vessels, chipped stone tools, a zoomorphic figurine and other finds characteristic of Bubanj–Hum I horizon (Pl. I/12–19; Pl. III/8–10).<sup>26</sup> The AMS analysis determined the age of  $5435 \pm 30$  BP (Fig. 6; Fig. 9/4), that is 4337–

4263 cal BC (68.2% probability), 4343–4245 cal BC (95.4% probability). It is interesting to note that the dating of these structures is largely overlapping, even if the first one is placed at an almost 1 m higher level than the previous one, although it is only half a metre distant. Two points must be considered: firstly, the sample could actually come from the layer in which the pit was dug and, thus, belongs to the underlying layer; secondly, it is noticeable that these dates fall into a small plateau in the radiocarbon calibration curve for this period. In these conditions, and from a strictly methodological point of view, further chronological precision remains out of reach and should be not pursued.

<sup>26</sup> Булатовић 2015, 11–12, сл. 1–2.

The third sample from Bubanj (bone of an undefined animal species) originates from the floor structure of a late Eneolithic house (structure 3) and belongs to the Early Eneolithic horizon of the site. It gives almost identical values as the previous samples –  $5445 \pm 24$  BP, that is 4338–4267 cal BC (68.2% probability) or 4344–4260 cal BC (95.4% probability) (Fig. 4; Fig. 9/2).

The last sample from Bubanj discussed here is possibly the most significant one, as it comes from a deep pit, probably used for waste disposal (structure 20), underneath a late Eneolithic or Early Bronze Age layer and dug through the Middle Eneolithic and the upper part of the Early Eneolithic layers.<sup>27</sup> The sample of the *Unio* shell from the bottom of the structure, whose level corresponds to the youngest horizon of the Early Eneolithic, showed a value of  $5087 \pm 25$  BP, or 3952–3810 cal BC (68.2% probability), or 3960–3800 cal BC (95.4% probability) (Fig. 7; Fig. 9/5). In addition to pottery corresponding to the late Eneolithic, i.e. the Coțofeni–Kostolac horizon, two potsherds decorated with a series of circular imprints were discovered, which, according to stylistic and typological features, can be attributed to the Bubanj–Hum I horizon (Pl. III/11, 12). It is interesting that, while the dates from the three closed contexts from the Early Eneolithic of Bubanj show an almost identical age of approx. 4350–4250 cal BC (bearing in mind the aforementioned effect of the calibration curve), this last sample is considerably later by almost 500 years. It thus seems that some of the – not directly dated – structures assigned to the latest horizon of the Early Eneolithic actually belong to this period, or rather there are no preserved structures from this period in this part of the site, but only a cultural layer, which in this case was cut by the pit marked as structure 20. This most recent date, however, is important, as it suggests that Bubanj was inhabited during this period, that is, that the Bubanj–Hum I horizon lasted considerably longer than previously thought, and that during this time span the basic stylistic and typological features remained rather homogeneous. It is important to underline that no elements characteristic of later cultural horizons, such as the so-called *Scheibenhenkel* (the disc-shaped handles), or the vessels with small handles placed at the junction of the body and the foot, which were discovered at the nearby Velika Humska Čuka site, are present here.<sup>28</sup>

The site of Mokranjske Stene lies about 8 km south of Negotin in eastern Serbia, not far from the Timok River and the Serbian-Bulgarian border (Fig. 1/6). Its extent covers both the hilltop and the foot of the hill

along the rocky walls. During the 2011–2013 excavation campaigns, a smaller stratified rock-shelter was explored, in which finds from several prehistoric periods were uncovered.<sup>29</sup> Starting from the 9<sup>th</sup> artificial excavation spit in the lower parts of a light brown earth cultural layer, characterised by the presence of Coțofeni culture pottery, potsherds with stylistic and typological characteristics of Bubanj–Hum I culture, as well as elements that did not correspond either with Coțofeni and Bubanj–Hum I culture, were recovered. These are thin plastic ribbons forming different shapes, series of triangular, oval, crescent, circular or rectangular imprints, incised net motifs, bowls with an inverted rim decorated with wide, deep oblique or horizontal channels, low vessels with a wide mouth, whose belly is adorned with rectangular vertical channels, stamped ornaments which resemble the so-called caterpillar ornament, and others (Pl. II). This pottery was recovered in the lower part of the layer of light brown soil and the layer of yellow soil below it, to its bottom, which lies directly above the bedrock. In the lower spits (layer of yellow soil), Bubanj–Hum I characteristic features became more abundant.

Finds belonging to Bubanj–Hum I culture in the yellow soil appear much less than the mentioned newer elements unusual for this culture, and it is possible that there was a layer with this pottery that preceded the Coțofeni culture, although it could not be distinguished during the excavation. A bone sample (*Bos taurus*) from the 9<sup>th</sup> artificial excavation spit gave a result of  $4875 \pm 23$  BP, that is 3692–3642 cal BC (68.2% probability), or 3698–3638 cal BC (95.4% probability) (Fig. 8; Fig. 9/6). The unusual stylistic and typological elements and the possibility of the existence of a layer of the later phase of Bubanj–Hum I culture at this site have already been pointed out, which is confirmed by this date in some way.<sup>30</sup> This date and the stylistic-typological characteristics of the pottery correspond to the layer of “Final Chalcolithic” from the site of Borovan in north-west Bulgaria, which is dated to the Galatin horizon i.e. to between 40<sup>th</sup>–37<sup>th</sup> c. cal BC.<sup>31</sup>

<sup>27</sup> Immediately above the pit, a grave from the new age was dug, which destroyed the upper part of the pit, so it is uncertain from exactly which layer it was dug.

<sup>28</sup> Such vessels were found during excavation in 2017.

<sup>29</sup> Капуран, Булатовић, Јањић 2013; Капуран, Јањић 2015; Булатовић 2015а.

<sup>30</sup> Булатовић 2015а, 29.

<sup>31</sup> Ganetsovski 2016.

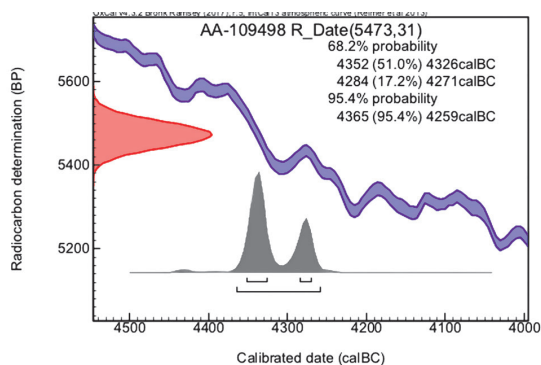


Fig. 3. Velika Humska Čuka, calibrated date chart  
 Сл. 3. Велика хумска чука, дијаграм калибрације датума

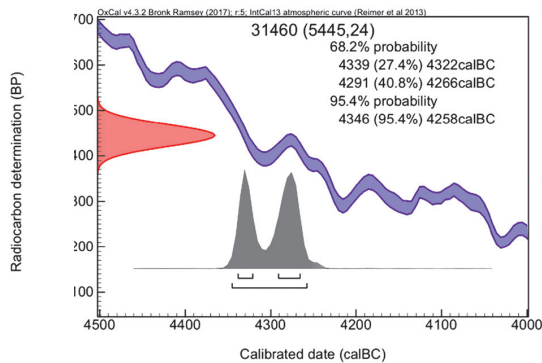


Fig. 4. Bujanj – structure 3, calibrated date chart  
 Сл. 4. Бубањ, објекти 3, дијаграм калибрације датума

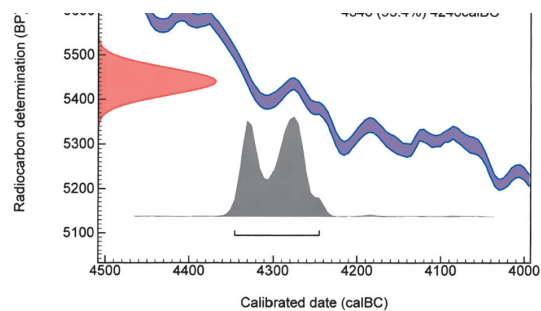


Fig. 5. Bujanj – structure 37, calibrated date chart  
 Сл. 5. Бубањ, објекти 37, дијаграм калибрације датума

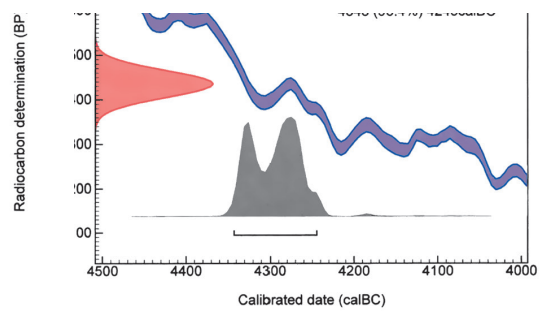


Fig. 6. Bujanj – structure 25/27, calibrated date chart  
 Сл. 6. Бубањ, објекти 25/27, дијаграм калибрације датума

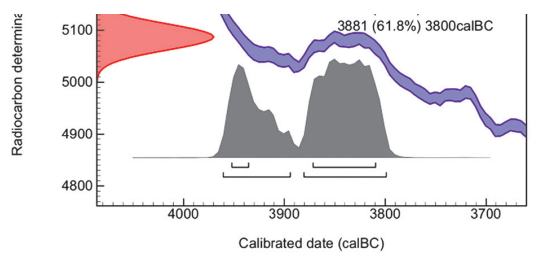
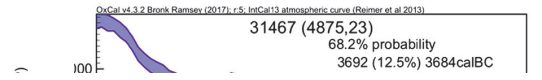
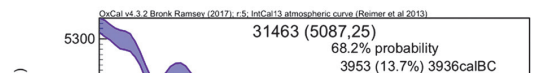


Fig. 7. Bujanj – structure 20, calibrated date chart  
 Сл. 7. Бубањ, објекти 20, дијаграм калибрације датума

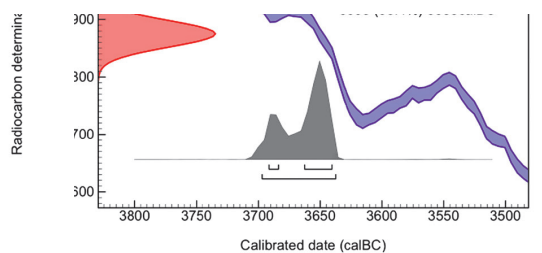


Fig. 8. Mokranjske Stene, calibrated date chart  
 Сл. 8. Мокрањске стене, дијаграм калибрације датума

Nr	Site (context)	Lab nr	Date (BP)	calBC (68.2% and 95.4%)	Sample
1.	Velika humska čuka (structure 2/16)	AA 109498	5473 ±31	4352-4271 4365-4259	Animal bone ( <i>Ovis/Capra</i> )
2.	Bubanj (structure 3)	MAMS 31460	5445 ±24	4338-4267 4344-4260	Animal bone (undefined animal species)
3.	Bubanj (structure 37)	Lyon 13690	5440 ±30	4346-4246	Animal bone ( <i>Ovis/Capra</i> )
4.	Bubanj (structure 25/27)	Lyon 13689	5435 ±30	4343-4245	Animal bone (long bone of an undefined animal species)
5.	Bubanj (structure 20)	MAMS 31463	5087 ±25	3952-3810 3960-3800	Shell terrestrial
6.	Mokranjske stene (split 9)	MAMS 31467	4875 ±23	3692-3642 3698-3638	Animal bone ( <i>Bos taurus</i> )

Fig. 9. New absolute dates of Early Eneolithic sites in the Central Balkans.

Сл. 9. Нови ајсолујни датуми са налазишћа старије енеолитне на централном Балкану

Pottery with similar stylistic and typological features also appears at other sites in Oltenia (Ostrovul Corbului, Băile Herculane and Bistret)<sup>32</sup> and in north-western Bulgaria (Galatin and Rebarkovo).<sup>33</sup> This cultural phenomenon is defined as the Galatin culture in north-west Bulgaria and the Sălcuța IV–Herculane II–III culture in Oltenia.

### Discussion

Most of the mentioned dates (Fig. 9/1–4), together with the recently published ones from Bubanj,<sup>34</sup> are contemporary and correspond to the dates for the BSK complex in Bulgaria and Romania. They range between the mid-44<sup>th</sup> and the mid-43<sup>rd</sup> centuries cal BC. Two dates deserve more attention (Fig. 9/5, 6), because they allow for a lower dating of the BSK complex, in the period between 40<sup>th</sup> and 37<sup>th</sup> c. cal BC, and thus represent the first dates in Serbia which indicate such a later chronology for the BSK complex. The stylistic and typological characteristics of pottery from the 9<sup>th</sup>–11<sup>th</sup> layers of Mokranjske Stene, as well as the sporadic finds from the pit at Bubanj (structure 20) from which these samples were taken, indicate that at that time the characteristics of Bubanj–Hum I pottery were still retained, and that they coexisted with new elements related to the cultures of Galatin and Sălcuța IV–Baile Herculane II–III, which date approximately to the same period. In the lower parts of the layer of light brown earth (layers 9<sup>th</sup>–11<sup>th</sup>) at Mokranjske Stene dated to the 37<sup>th</sup> century cal BC, numerous elements of these cultures were indeed noticed, while at Bubanj, which showed somewhat higher dates (40<sup>th</sup>–39<sup>th</sup> centuries cal BC), the situation appears significantly different, since these elements are almost nonexistent. It remains to be explained whether the geographical location of these sites or their different chronological affiliation is the cause

of this discrepancy. Chronological affiliation seems a more likely explanation, as numerous finds with the elements that correspond to the Sălcuța IV culture were discovered in a yet undated layer at the nearby site of Velika Humska Čuka (e.g. *Scheinbenhenkel* handles, vessels on a foot with small handles placed at the junction of the body and the foot, parallel incisions carried out in different directions, etc.).<sup>35</sup> However, a layer with numerous *Scheibenhenkel* handles at Borovan, a site in north-west Bulgaria, was dated to between 40<sup>th</sup> and 37<sup>th</sup> c. cal BC, which could probably have been expected for this layer on the Velika Humska Čuka site.

It must be reminded however, that the accuracy of these two late samples, especially the one from Bubanj, is possibly hampered by poor stratigraphic contexts. Further confirmation of these results will have to be sought with additional dates from more reliable closed units.

So far, the earliest dates for the BSK complex come from Oltenia (Curmatura and Ostrovul Corbului) and north-western Bulgaria (Liga), while the earliest date for Serbia comes from the western part of the country (Bodnjik). The absolute date from the oldest phase from Pilavo, a site in eastern Republic of Macedonia, which was ascribed to the Šuplevac–Bakarno Gumno culture, is 4540–4330 cal BC.<sup>36</sup> This dating is quite high and seems to indicate that this complex developed

<sup>32</sup> Roman 1971, Abb. 6/14, 29/15; Taf. XIV, XVIII, XXVIII; Sălceanu 2008, Foto 4, 15/5.

<sup>33</sup> Georgieva 1987; Georgieva 1993, Fig. 2/5..

<sup>34</sup> Bulatović, Vander Linden 2017, Tab. 1/1, 2.

<sup>35</sup> The finds from the 2009 excavation have been published (Булатовић, Милановић 2015, Т. II/26–31), while the largest number of the finds with those elements still remain unpublished.

<sup>36</sup> Здравковски 2009, 20.

equally throughout its whole territory, as also suggested by a number of elements present in the pottery inventory of the Šuplevac–Bakarno Gumno sites (BSK complex) that are rooted in the Gradešnica–Slatino–Dikli Tash II culture. The Gradešnica–Slatino–Dikli Tash II dates to a slightly earlier period<sup>37</sup> and can be recognised in present-day south-western Bulgaria and northern Greece.

Also of interest is another dating from Pilavo (3750 cal BC), which comes from the latest phase of the site. This dating, on the other hand, could chronologically define the later horizon of the Šuplevac–Bakarno Gumno culture, which is parallel to the Sălcuța IV culture or Galatin culture. Regrettably, although, in the first publication of the research in Pilavo, two stages are mentioned,<sup>38</sup> nowhere in more recent publications are those phases clearly defined, and it is impossible to understand which of the published finds belongs to which of these two phases. For this reason, the stylistic and typological characteristics of the pottery of each phase cannot be clearly identified.<sup>39</sup> However, published pottery from Pilavo, according to the stylistic and typological characteristics – in particular bowl types and graphite and red painting decorations – recall the finds from Velika Humska Čuka, including those from structure 2/16, whose dating is known.

### Conclusions

The AMS radiocarbon dates presented in this paper substantially contribute to the chronological determination of the Bubanj–Hum I culture within the BSK complex. Four dates confirm the previously published

results (three dates from Bodnjik and Bubanj), while the other two provide significant information, opening a discussion regarding the length of the Bubanj–Hum I culture. As we pointed out, there are some indications that this culture extended to the first centuries of the 4<sup>th</sup> millennium cal BC, in combination with new cultural elements which are characteristic of north-western Bulgaria and south-western Romania in the same period. If both dates from the Pilavo site in the eastern part of the Republic of Macedonia can be actually assigned to the layers showing Šuplevac–Bakarno Gumno features, this would mean that this cultural complex originated almost simultaneously in Oltenia, north-western Bulgaria and eastern Republic of Macedonia.

While these dates from Serbia are not confirmed by samples from closed units, and until the stratigraphic situation at the Pilavo site is resolved, the issue of the length of the BSK cultural complex remains open.

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*Translated by the authors*

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Часопис *Старинар* је доступан у режиму отвореног приступа. Чланци објављени у часопису могу се бесплатно преузети са сајта часописа и користити у складу са лиценцом Creative Commons – Ауторство-Некомерцијално-Без прерада 3.0 Србија (<https://creativecommons.org/licenses/by-nc-nd/3.0/rs/>).

<sup>37</sup> Boyadziev 1995, 182, Tab. 5.

<sup>38</sup> Настева 1989, 49.

<sup>39</sup> Колиштркоска-Настева 1999, 25–32; Колиштркоска-Настева, Курпузова 2005, 57–66. A large number of finds from this site that corresponds to the Šuplevac–Bakarno Gumno culture (local variant of the BSK complex), such as two handled beakers and bowls decorated with graphite, anthropomorphic figurines with oversized glutei decorated with deep incisions etc., are on show in a new permanent exhibition of the Museum of Macedonia in Skopje. All finds were attributed to the 4<sup>th</sup> millennium BC (the Museum was visited in September 2017).



## BIBLIOGRAPHY:

**Antonović 2014** – D. Antonović, *Die Kupferzeitliche Äxte und Beile in Serbien. Prähistorische Bronzefunde IX/27*, Stuttgart 2014.

**Bartelheim, Krauß 2012** – M. Bartelheim, R. Krauß, Sense and Non-sense of the term “Chalcolithic”, in: *Is there a British Chalcolithic? People, place and polity in the later 3rd millennium* (eds.) M. J. Allen, J. Gardiner, A. Sheridan, Oxbow Books 2014, 85–97.

**Boyadziev 1995** – Y. Boyadziev, Chronology of Prehistoric Cultures in Bulgaria, in: *Prehistoric Bulgaria, Monographs in World Archaeology No. 22*, (eds.) D.W. Bailey, I. Panayotov, Madison Wisconsin 1995, 149–191.

**Bronk Ramsey 2009** – C. Bronk Ramsey, Bayesian analysis of radiocarbon dates, *Radiocarbon* 51 (1), 337–360.

**Bulatović 2014** – A. Bulatović, Corded Ware in the Central and Southern Balkans: A Consequence of Cultural Interaction or an Indication of Ethnic Change?, *Journal of Indo-European Studies* 42, 2014, 101–143.

**Булатовић 2015** – А. Булатовић, Феномен праисторијских ритуалних јама, неколико примера са централног Балкана, *Старинар* н.с. LXV, 2015, 7–35. (A. Bulatović, Fenomen praistorijskih ritualnih jama, nekoliko primera sa centralnog Balkana, *Starinar* n.s. LXV, 2015, 7–35).

**Булатовић 2015а** – А. Булатовић, Енеолитски период на локалитету Мокрањске стене, у: *Мокрањске стене, културна баштина Неготинске Крајине*, (ур.) А. Капуран, А. Булатовић, Неготин: Музеј Неготинске Крајине 2015, 33–49. (A. Bulatović, Eneolitski period na lokalitetu Mokranjske stene, in: *Mokranjske stene, kulturna baština Negotinske Krajine*, (eds.) A. Kapuran, A. Bulatović, Negotin: Muzej Negotinske Krajine 2015, 33–49).

**Булатовић, Милановић 2015** – А. Булатовић, Д. Милановић, Велика хумска чука, истраживања 2009. године – прилог проучавању стратиграфије енеолита и бронзаног доба у југоисточној Србији, *Гласник Српског археолошког друштва* 30 (2014), 2015, 163–188. (A. Bulatović, D. Milanović, Velika humska čuka, istraživanja 2009. godine – prilog proučavanju stratigrafije eneolita i bronzanog doba u jugoistočnoj Srbiji, *Glasnik Srpskog arheološkog društva* 30 (2014), 2015, 163–188).

**Bulatović, Milanović, forthcoming** – A. Bulatović, D. Milanović, *Bubanj, the Eneolithic and the early Bronze Age tell in southeastern Serbia*.

**Bulatović, Vander Linden 2017** – A. Bulatović, M. Vander Linden, Absolute Dating of Copper and Early Bronze Age Levels at the Eponymous Archaeological Site Bubanj (South-eastern Serbia), *Radiocarbon*, Vol. 59 (4), 2017, 1047–1065.

**Здравковски 2009** – Д. Здравковски, Неолитската уметност на Македонија, у: *Неолитската уметност на територијата на Република Македонија* (ур.) А. Шемров, П. Турк, Љубљана 2009, 15–35. (D. Zdravkovski, Neolitskata umetnost na Makedonija, in: *Neolitskata umetnost na teritorijata na Republika Makedonija* (eds.) A. Šemrov, P. Turk, Ljubljana 2009, 15–35).

**Ganetsovski 2016** – G. Ganetsovski, The Prehistoric settlement in the Ezeroto locality near the village of Borovan, Northwestern Bulgaria, in: *The human face of Radiocarbon*, (ed.) Z. Tsirtsoni, Lyon 2016, 115–123.

**Гарашанин, Ђурић 1983** – М. Гарашанин, Н. Ђурић, *Бубањ и Велика Хумска Чука*, каталог изложбе, Ниш: Народни музеј 1983. (M. Garašanin, N. Đurić, *Bubanj i Velika Humska Čuka*, katalog izložbe, Niš: Narodni muzej 1983).

**Гарашанин, Симоска 1976** – М. Гарашанин, Д. Симоска, Контролни ископувања на Шуплевец и некои проблеми на групата Шуплевец–Бакарно гумно, *Macedoniae Acta Archaeologica* 2, 1976, 9–41. (M. Garašanin, D. Simoska, Kontrolni iskopivanja na Šuplevec i neкои problemi na grupata Šuplevec–Bakarno gumno, *Macedoniae Acta Archaeologica* 2, 1976, 9–41).

**Георгиева 1987** – П. Георгиева, Материали от претходниот период между каменномедната и бронзовата епоха от Северна Бугарија, *Археологија*, кн. 1, 1987, 1–15. (P. Georgieva, Materiali ot prethodnia period meždu kamenno-mednata i bronzovata eпоha ot Severna Bulgaria, *Arheologija*, kn. 1, 1987, 1–15).

**Georgieva 1993** – P. Georgieva, Galatin culture, in: *The Fourth millennium B.C.* (ed.) P. Georgieva, Sofia 1993, 109–115.

**Георгиева 2005** – П. Георгиева, За зооморфните скиптри и последните етапи на ксноенеолитните култури Варна, Коцадермен–Гумелница–Караново VI и Криводол–Сълкуца, in: *Studia archaeologica universitatis Serdicensis*, Supplementum IV, Stephanos archaeologicos in honorem professoris Ludmili Getov, (eds.) Л. С. Гетов, Т. Н. Стоянов, С. Г. Ангелова, И. М. Лозанов, К. К. Рабадиев, М. М. Милчева, Универзитетско издателство „Св. Климент Охридски“, Софија 2005, 144–167. (P. Georgieva, Za zoomorfните skiptri i poslednite etapi na kasnoeneolitnite kulturi Varna, Kodzhadermen–Gumelnitsa–Karanovo VI i Krivodol–Salkutsa, in: *Studia archaeologica universitatis Serdicensis*, Supplementum IV, Stephanos archaeologicos in honorem professoris Ludmili Getov, (eds.) L.S. Getov, T. N. Stoyanov, S. G. Angelova, I. M. Lozanov, K. K. Rabadzhiev, M. M. Milcheva, Sofia: Universitetsko izdatelstvo „Sv. Kliment Ohridski“ 2005, 144–167).

- Higham et al. 2007** – T. Higham, J. Chapman, V. Slavchev, B. Gaydarska, N. Honch, Y. Yordanov, B. Dimitrova, New perspectives on the Varna cemetery (Bulgaria) – AMS dates and social implications, *Antiquity*, 81, 2007, 640–651.
- Капуран, Булатовић, Јањић 2013** – А. Капуран, А. Булатовић, Г. Јањић, *Неготиин, културна стратиграфија праисторијских локалитета у Неготиинској Крајини*. Археолошки институт, Београд–Музеј Крајине, Неготин 2013. (А. Капуран, А. Булатовић, Г. Јањић, *Negotin, kulturna stratigrafija praistorijskih lokaliteta u Negotinskoj Krajini*. Beograd–Negotin: Arheološki institut, Muzej Krajine 2013).
- Капуран, Јањић 2015** – А. Капуран, Г. Јањић, Стратиграфија археолошког комплекса Мокрањске стене, у: *Мокрањске стене, културна баштина Неготиинске Крајине*, (ур.) А. Капуран, А. Булатовић, Неготин: Музеј Неготинске Крајине 2015, 9–22. (А. Капуран, Г. Јањић, *Stratigrafija arheološkog kompleksa Mokranjske stene*, in: *Mokranjske stene, kulturna baština Negotinske Krajine*, (eds.) А. Капуран, А. Булатовић, Неготин: Музеј Неготинске Крајине 2015, 9–22).
- Капуран, Булатовић, Милановић 2017**– А. Капуран, А. Булатовић, Д. Милановић, Settlement pattern changes through Central Balkan Copper Age, in: *Communities in transition – the Circum-Aegean Later Neolithic Stages*, (eds.) S. Dietz, F. Mavridis, Ž. Tankosić, T. Takaoğlu, Proceedings from International Conference at the Athens Museum and the Danish Institute at Athens, June 7<sup>th</sup> to 9<sup>th</sup> 2013, Oxbow Books 2017, 77–88.
- Колиштркоска-Настева 1999** – И. Колиштркоска-Настева, Антропоморфни и зооморфни фигурици од енеолитског периода – Лок. Пилаво, Бурилчево, *Macedonia Acta Archaeologica* 15, 1999, 25–32. (I. Kolishtrkoska-Nasteva, Antropomorfni i zoomorfni figurini od eneolitskiot period – Lok. Pilavo, Butilchevo, *Macedonia Acta Archaeologica* 15, 1999, 25–32).
- Колиштркоска-Настева, Курпузова 2005** – И. Колиштркоска-Настева, С. Курпузова, Графитно декорирана керамика од лок. Пилаво, с. Бурилчево, Кочанско, *Зборник Археологија 2*, 2005, 57–66. (I. Kolishtrkoska-Nasteva, S. Kurpuzova, Grafitno dekorirana keramika od lok. Pilavo, s. Butilchevo, Kochansko, *Zbornik Arheologija 2*, 2005, 57–66).
- Kromer et al. 2013** – Kromer, Bernd, Lindauer, Susanne, Synal, Hans-Arno, & Wacker, Lukas, MAMS – A new AMS facility at the Curt-Engelhorn-Centre for Archaeometry, Mannheim, Germany, *Nuclear Instruments and Methods in Physics Research Section B, Beam Interactions with Materials and Atoms*, 11–13. doi:10.1016/j.nimb.2012.01.015.
- Lazarovici 2006** – С. М. Lazarovici, Absolute Chronology of the Late Vinča Culture in Romania and its role in the Development of the Early Copper Age, *Homage to Milutin Garašanin*, (eds.) N. Tasić, C. Grozdanov, Serbian Academy of Sciences and Arts and Macedonian Academy of Sciences and Arts, Belgrade 2006, 277–293.
- Link 2006** – Т. Link, *Das Ende der neolithischen Tellsiedlungen. Ein kulturgeschichtliches Phänomen des 5. Jahrtausends v. Chr. im Karpatenbecken*. Bonn 2006.
- Merkyte 2005** – I. Merkyte, *Liga Copper Age strategies in Bulgaria*, Kobenhavn 2005.
- Милановић, Трајковић-Филиповић 2015** – Д. Милановић, Т. Трајковић-Филиповић, *Стара ископавања на локалитету Бубањ*, Ниш: Народни музеј. (D. Milanović, T. Trajković-Filipović, *Stara iskopavanja na lokalitetu Bujanj*, Niš: Narodni muzej.).
- Настева 1989** – И. Настева, *Arheološki pregled* 28, 1989, 49, Ljubljana. (I. Nasteva, *Arheološki pregled* 28, 1989, 49, Ljubljana).
- Roman 1971** – P. Roman, Strukturänderungen des Endeneolithikums im Donau-Karpaten-Raum, *Dacia* XV, 1971, 31–169.
- Sălceanu 2008** – I. Sălceanu, *Sălcuța IV – Herculanе II–III*, Fundația “Rădăcinile Europei”, Satu Mare 2008.
- Schier 2014** – W. Schier, The Copper Age in Southeast Europe – historical epoch or typo-chronological construct?, in: *The Neolithic and Eneolithic in Southeast Europe* (eds.) B. Hansel, W. Schrier, Verlag Marie Leidorf GMBH, Rahden/Westf., 2014, 419–435.
- Tasić 1995** – N. Tasić, *Eneolithic cultures of Central and West Balkans*. Beograd 1995.
- Todorova 1981**– Н. Todorova, *Die kupferzeitlichen Äxte und Beile in Bulgarien*, PBF Abt. IX, Band 14, Stuttgart 1981.
- Todorova 2003** – Н. Todorova, Prehistory of Bulgaria, in: *Recent Research in the Prehistory of the Balkans*, (ed.) D. V. Grammenos, Thessaloniki 2003, 257–328.
- Живановић 2013** – З. Живановић, *Енеолитска градина Бодњик*. Коцелјева: Завичајни музеј 2013. (Z. Živanović, *Eneolitska gradina Bodnjik*. Koceljewa: Zavičajni muzej 2013).

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## НОВИ АПСОЛУТНИ ДАТУМИ КАО ПРИЛОГ АПСОЛУТНОЈ ХРОНОЛОГИЈИ СТАРИЈЕГ ЕНЕОЛИТА НА ЦЕНТРАЛНОМ БАЛКАНУ

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У раду је представљено шест апсолутних датума из старијег енеолита са три локалитета у Србији. Четири датума потичу са локалитета Бубањ код Ниша, један је са локалитета Велика хумска чука, такође код Ниша, а последњи датум потиче са локалитета Мокрањске стене код Неготина.

Датовани узорак са Велике хумске чуке откривен је у остацима једног стамбеног објекта, непосредно до бакарног длета (клина) (Т. III/1) и многобројне керамике која припада Бубањ–Хум I култури (Т. I/1–8). Анализом АМС овај узорак је опредељен у  $5473 \pm 31$  ВР (сл. 2), односно 4352–4271 calBC (вероватноћа 68,2%) или 4365–4259 calBC (вероватноћа 95,4%) (сл. 8/1).

Од четири датована узорка са локалитета Бубањ два су откривена у затвореним целинама из старијег енеолита (објекти 25/27 и 37), један узорак потиче из јаме која је пробила и слој старијег енеолита (објекат 20), док је последњи нађен у целини из позног енеолита (објекат 3), где је доспео, вероватно, приликом земљаних радова обављаних у том периоду. Узорак из објекта 25/27 датован је у  $5435 \pm 30$  ВР (сл. 5, 8/4), односно 4337–4263 calBC (вероватноћа 68,2%), 4343–4245 calBC (вероватноћа 95,4%); узорак из објекта 37 у  $5440 \pm 30$  ВР (сл. 4, 8/3), што износи 4339–4263 calBC (вероватноћа 68,3%), или 4346–4246 calBC (вероватноћа 95,4%), док је узорак из објекта 3 дао датум  $5445 \pm 24$  ВР, што износи 4338–4267 calBC (вероватноћа 68,2%) или 4344–4260 calBC (вероватноћа 95,4%) (сл. 3, 8/2). Последњи узорак са Бубња потиче са дна јаме (објекат 20) која је пробила слој старијег енеолита.

Уз већу количину пужева и малобројну керамику (Т. III/11, 12) на дну јаме је нађена и шкољка која је датована у време  $5087 \pm 25$  ВР, односно 3952–3810 calBC (вероватноћа 68,2%), или 3960–3800 calBC (вероватноћа 95,4%) (сл. 6). Овај датум је значајан стога што индицира могућност да је

Бубањ–Хум I култура, као део Бубањ–Салкуца–Криводол комплекса, егзистирала на овим просторима и у првим вековима 4. миленијума пре н. е.

На дуже трајање културе Бубањ–Хум I него што се то до сада мислило упућује и узорак са Мокрањских стена који је дао још нижи датум –  $4875 \pm 23$  ВР, односно 3692–3642 calBC (вероватноћа 68,2%), или 3698–3638 calBC (вероватноћа 95,4%) (сл. 7, 8/6). Овај узорак потиче са дна слоја светломрке земље у којем је преовладала керамика Коцопени културе, али у којем је откривена и керамика Бубањ–Хум I културе, као и керамика слична керамици констатованој у културама Галатин и Салкуца IV (Т. II) у северозападној Бугарској и Олтенији. Непосредно испод тог слоја на Мокрањским стенама налазио се танак слој жуте земље у којем је доминирала керамика Бубањ–Хум I културе, али са спорадичним налазима који подсећају на горепоменуте културе из југозападне Румуније и северозападне Бугарске. Слој са сличном керамиком на налазишту Борован у северозападној Бугарској датован је у приближно исти период као и узорци са Бубња и Мокрањских стена – између 40. и 37. века пре н. е.

Иако не потичу из потпуно поузданих целина, датуми са Бубња и Мокрањских стена допуштају могућност да је Бубањ–Хум I култура, као део БСК комплекса, егзистирала на овим просторима, бар у источној и југоисточној Србији и у првом кварталу 4. миленијума пре н. е. На ово упућују и датуми са локалитета Пилаво у Македонији (Шуплевац – Бакарно гумно култура – регионална варијанта Бубањ–Салкуца–Криводол комплекса), који се крећу између 4540/4330 и 3750 calBC. Међутим, све док се сви ови датуми не потврде додатном серијом датума са више локалитета из различитих регија овог комплекса, питање трајања комплекса БСК на Балкану остаје отворено.

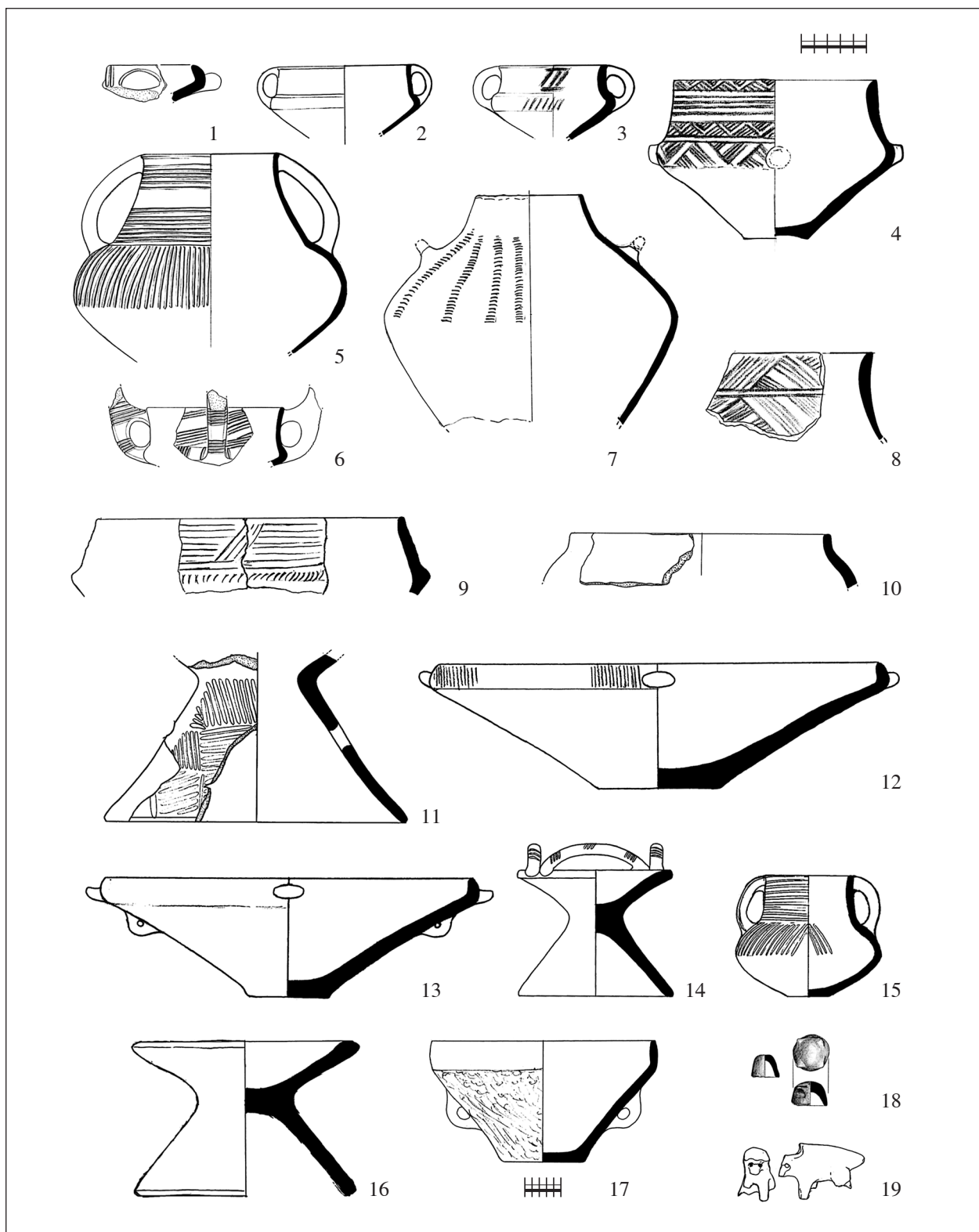


Plate I – 1–8) Velika Humska Čuka, structure 2/16; 9–11) Bubaň, structure 37; 12–19) Bubaň, structure 25/27 (drawings by J. Antić)

Табла I – 1–8) Велика хумска чука, објекти 2/16; 9–11) Бубањ, објекти 37; 12–19) Бубањ, објекти 25/27 (цртежи: Ј. Антић)

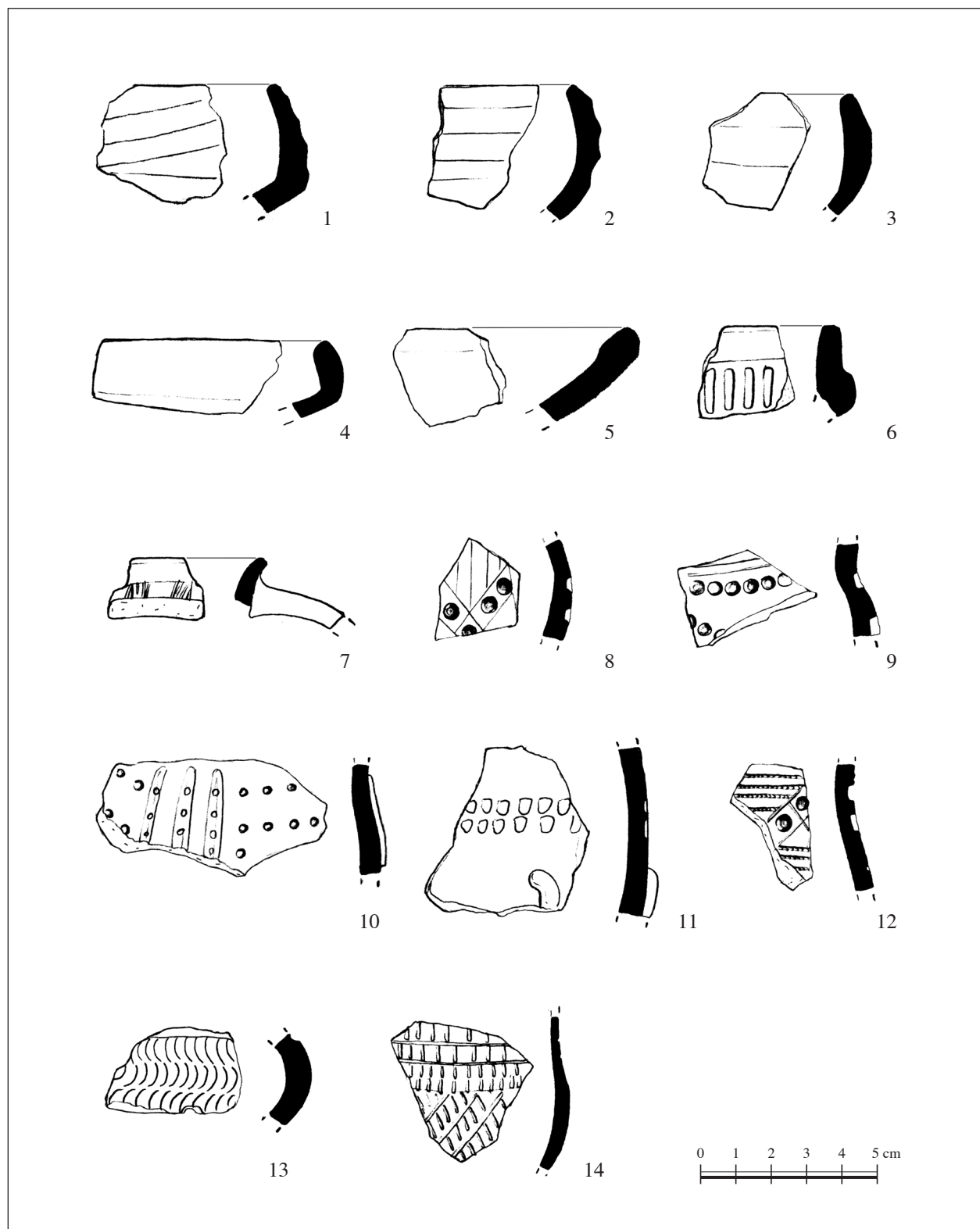


Plate II – 1–14) Mokranjske Stene, trench 2, 9<sup>th</sup>–11<sup>th</sup> artificial spits  
(drawings by A. Karuran)

Табла II – 1–14) Мокрањске сџене, сонда 2, оџкојни слојеви 9–11  
(црџежи: А. Каџуран)

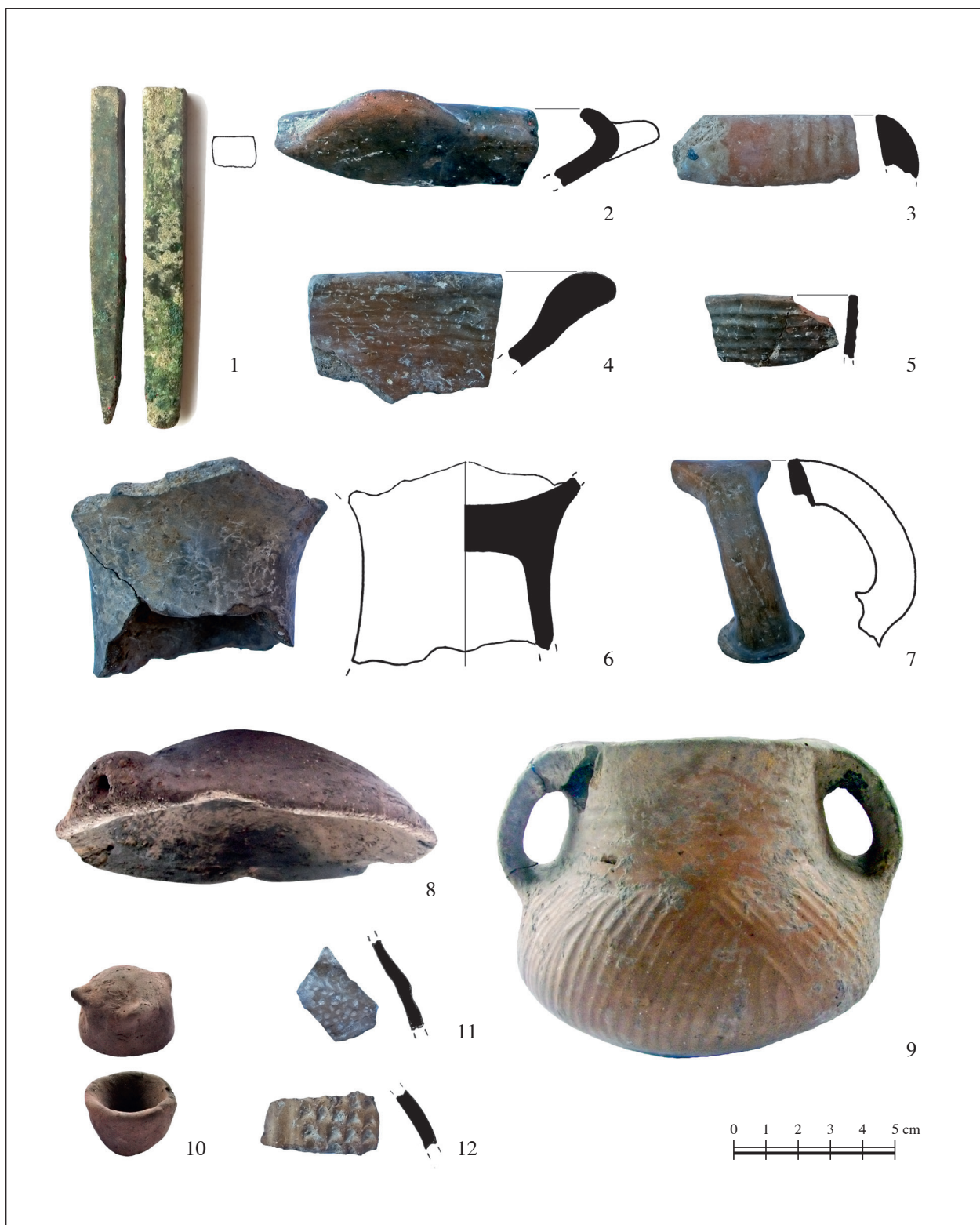


Plate III – 1) Velika Humska Čuka, structure 2/16; 2–7) Bubaň, structure 37; 8–10) Bubaň, structure 25/27; 11–12) Bubaň, structure 20

Табла III – 1) Велика хумска чука, објекти 2/16; 2–7) Бубањ, објекти 37; 8–10) Бубањ, објекти 25/27; 11–12) Бубањ, објекти 20